IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

CARNEGIE INSTITUTION OF WASHINGTON and M7D CORPORATION, Plaintiffs, v. FENIX DIAMONDS LLC, Defendant.	Civil Action No. 1:20-cv-00200-JSR

DEFENDANT FENIX DIAMONDS LLC'S RULE 56.1 STATEMENT OF UNCONTESTED MATERIAL FACTS IN SUPPORT OF ITS MOTION FOR SUMMARY JUDGMENT OF NON-INFRINGEMENT

[redacted]

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Pursuant to Local Rule 56.1, Defendant Fenix Diamonds LLC submits the following Statement of Uncontested Material Facts in connection with its Motion for Summary Judgment of Non-Infringement.

I. THE PLEADINGS AND THE PARTIES

1. On January 9, 2020, Plaintiffs Carnegie Institution of Washington ("Carnegie") and M7D Corporation ("M7D") (collectively, "Plaintiffs") filed an initial complaint for patent infringement of U.S. Patent Nos. 6,858,078 ("the '078 patent") and RE41,189 ("the '189 patent") against Mahendra Brothers Exports Private Limited D/B/A Mahendra Brothers ("Mahendra") and Fenix Diamonds LLC Fenix Diamonds LLC ("Fenix"). ECF No. 1.

2. On March 5, 2020, Plaintiffs amended their complaint before Mahendra or Fenix filed an answer. The amended complaint withdrew all allegations against Mahendra. ECF No. 16.

3. On May 18, 2020, Fenix filed an answer to the amended complaint and counterclaims against Plaintiffs for declarations of non-infringement and invalidity of both the '078 patent and the '189 patent. ECF No. 43.

4. On June 23, 2020, before Plaintiffs filed an answer to Fenix's counterclaims, Fenix amended its affirmative defenses and counterclaims. ECF No. 57.

5. On September 14, 2020, Plaintiffs filed their answer to Fenix's amended counterclaims. ECF No. 93.

6. Defendant Fenix is a New York Domestic Limited Liability Company with a headquarters at 592 Fifth Avenue, #1103, New York, New York 10036. ECF No. 93 at ¶ 3.

7. Plaintiff Carnegie is a Washington, D.C. corporation with its headquarters and principal place of business at 1530 P Street NW, Washington, D.C. 20005. ECF No. 93 at ¶ 4.

8. Plaintiff M7D is a Delaware corporation with its headquarters and principal place of business at 6700 Virginia Manor Road, Beltsville, Maryland 20705. ECF No. 93 at ¶ 5.

[redacted]

9. The Court has jurisdiction over the parties. ECF No. 93 at ¶ 8.

II. THE ASSERTED CLAIMS

10. Plaintiffs' amended complaint alleged that Fenix infringed claims 1, 6, 7, 11, 12 and 16 of the '078 patent, and claims 1 and 2 of the '189 patent. ECF No. 93 at ¶ 10.

11. Plaintiffs' subsequent infringement contentions alleged that Fenix infringed claims 1, 6, 11, 12 and 16 of the '078 patent, and claims 1 and 2 of the '189 patent. Ex. 1[1], Second Amended Plaintiffs' Local Patent Rule 6 Disclosure to Defendant Fenix Diamonds LLC ("Plaintiffs' Infringement Contentions").

12. Plaintiffs' expert disclosures state that Plaintiffs no longer assert that Fenix infringes the '189 patent.

13. There are two independent claims among the asserted claims of the '078 patent, i.e., claims 1 and 12. Claims 1 and 12 of the '078 patent recite:

Claim 1	Claim 12
A method for diamond production, comprising: controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.; and growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface at a growth temperature in a deposition chamber having an atmosphere with a pressure of at least 130 torr. Ex. 2, '078 patent at 14:64–15:4.	A method for diamond production, comprising: controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C.; and growing single-crystal diamond by microwave plasma chemical vapor deposition on the growth surface at a temperature of 900–1400° C. '078 patent at 15:31–37.

[1] "Ex. _" refers to the indicated Exhibit to the Declaration of Nicole Kopinski, filed concurrently herewith.

[redacted]

14. Independent claim 1 of the '189 patent recites: "A method to improve the optical clarity of CVD diamond where the CVD diamond is single crystal CVD diamond, by raising the CVD diamond to a set temperature of at least 1500° C. and a pressure of at least 4.0 GPA outside of the diamond stable phase." Ex. 3, '189 patent at 4:10–14. Claim 2 of the '189 patent is dependent on claim 1. '189 patent at 4:15–16.

III. CLAIM CONSTRUCTION

15. On May 8, 2020, the Court issued a *Markman* order construing claims 1 and 12 of the '078 patent. ECF No. 42 at 12–29 ("*Markman* Order").

16. The term "growth surface" means "the surface upon which diamond growth is occurring." *Markman* Order at 18–20.

17. The "growth surface" "[refers] to the entire surface where hydrocarbon gases are accruing into new diamond." *Markman* Order at 19.

18. The "growth surface" "must . . . not exclude polycrystalline growth." *Markman* Order at 20.

19. The Court held that "Plaintiffs' proposed construction [of "growth surface"]. . . would wrongly restrict the term to include only surface area where single-crystal diamond is growing." *Markman* Order at 19–20.

20. The Court noted that even where the '078 patent's "method of growing single-crystal diamond is followed, small amounts of polycrystalline diamond will nonetheless grow in localized places on the diamond." *Markman* Order at 19 (citing '078 patent at 13:66–14:1).

21. The '078 patent acknowledges that the microwave plasma chemical vapor deposition method can also produce polycrystalline material. *Markman* Order at 19–20 (citing '078 patent at 13:25–26).

[redacted]

22. The term "single-crystal diamond" means "a stand alone diamond having insubstantial non-monocrystalline growth." *Markman* Order at 27–29.

23. A diamond can still be single-crystal even if it contains small and localized amounts of non-monocrystalline material. *Markman* Order at 28.

24. Non-monocrystalline growth includes polycrystalline diamond, twinned diamond, graphite, and diamond-like carbon. *Markman* Order at 28–29.

25. The Court construed the claim term "controlling the temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are less than 20° C" to mean "controlling temperature of a growth surface of the diamond such that all temperature gradients across the growth surface are maintained at less than 20° C." *Markman* Order at 18.

26. The Court construed the term "all" in the phrase "all temperature gradients" to mean "the differences in temperature between any one spot on the growth surface and any other." *Markman* Order at 14.

27. The Court further explained that the word "maintained" in its construction means that all temperature gradients must be below 20° C "for substantially the entire growth process." *Markman* Order at 17.

IV. PLAINTIFFS' EXPERT DISCLOSURES

28. On September 18, 2020, Plaintiffs submitted a Rule 26(a)(2) expert report in support of their infringement assertions against Fenix with respect to the '078 patent. Ex. 4, Expert Report of Michael Capano, Ph.D. Regarding Infringement of U.S. Patent No. 6,858,078 ("Capano Rpt.").

29. Plaintiffs' infringement theory, as advanced through Dr. Capano, interprets "growth surface" to exclude polycrystalline diamond growth:

> I do not interpret growth surface to include the non-diamond or polycrystalline diamond that grows at the periphery of the single crystal diamond.

Capano Rpt. at ¶ 173.

30. Plaintiffs' infringement theory, as advanced through Dr. Capano, also interprets "diamond" to exclude polycrystalline diamond growth:

> I do not read the claim to include the polycrystalline material growing on Nouveau's diamonds as part of the diamond or its growth surface as set forth in the claims.

Capano Rpt. at ¶ 214.

31. Nouveau's diamonds have a polycrystalline region. Capano Rpt. at ¶ 215; citing Ex. 5, Joint Affidavit of and ("Nouveau Affidavit") (NV958–77) at ¶ 5N.

32. Dr. Capano offered the following opinion regarding polycrystalline material on Nouveau's diamonds:

> Fenix/No[uv]eau may argue that when the grown diamonds are removed from the MPCVD chamber, that the polycrystalline therefore cannot meet the court's construction of "insubstantial non-monocrystalline growth." Under this interpretation, it would be impossible to grow single crystal material via MPCVD because polycrystalline growth on the edges (e.g., 010 faces) during MPCVD is inevitable.

Capano Rpt. at ¶ 281; *see also* Capano Rpt. at ¶¶ 107, 275; Ex. 6, Expert Report of J. Michael Pinneo, Ph.D. Regarding Non-Infringement of U.S. Patent No. 6,858,078 ("Pinneo Rpt.") at ¶¶ 477–78.

33. Plaintiffs submitted a Rule 26(a)(2) expert report regarding the validity of the '078 patent and the '189 patent. Ex. 7, Expert Report of Karen K. Gleason, Ph.D. Regarding Validity of U.S. Patent Nos. 6,858,078 and RE41,189 ("Gleason Rpt.").

34. Like Dr. Capano, Dr. Gleason interprets "growth surface" to exclude polycrystalline growth. Gleason Rpt. at ¶¶ 681–82.

[redacted]

35. According to Dr. Gleason, images of Nouveau's diamonds "do[] not show polycrystalline growth 'across the growth surface' of the diamond." because "growth surface" only refers to the [redacted] clear single-crystal domains and does not refer to the [redacted] non-monocrystalline domains shown in NV4255 and NV4264. Gleason Rpt. at ¶ 682.

NV4255

[redacted]

[redacted]

NV4256

36. The article entitled "Very High Growth Rate Chemical Vapor Deposition of Single-Crystal Diamond," by the named inventors of the '078 patent, Chih-shiue Yan, Yogesh Vohra, Ho-kwang Mao, and Russell Hemley, is incorporated by reference in its entirety in the '078 patent. '078 patent at 14:43–49. The article states that "any polycrystalline character of the CVD diamond is localized on the edge" but "[a]fter polishing off the small amount of black diamond-like carbon . . . our CVD diamond is a single crystal." Ex. 8, Yan et al., 20 PNAS 12523–25, at 12524.

37. [redacted]

38. Plaintiffs did not submit an expert report in support of their infringement assertions with respect to the '189 patent. *See* Ex. 10, Expert Report of John C. Jarosz ("Jarosz Rpt.") at 2 n.2

[redacted]

(stating that the '189 patent is "no longer at issue"); Capano Rpt. at ¶¶ 1–3, 153 (stating that the '189 patent "not asserted against Fenix").

V. THE DIAMONDS AT ISSUE ARE MADE BY NOUVEAU DIAMONDS LLP

39. Fenix does not manufacture diamonds. Ex. 11, Mehta Dep. Tr. at 33:22–34:3.

40. Nouveau Diamonds LLP ("Nouveau") supplies Fenix with the diamonds alleged to infringe the '078 patent. Mehta Dep. Tr. at 40:1–4.

VI. NOUVEAU'S PROCESS FOR GROWING DIAMOND

41. On October 9, 2020, Fenix submitted Rule 26(a)(2) expert reports in support of non-infringement with respect to the '078 patent. Pinneo Rpt.; Ex. 12, Rebuttal Expert Report of Dr. John Martens Regarding U.S. Patent 6,585,078 ("Martens Rpt.").

A. Nouveau's Diamonds Have Substantial Non-Monocrystalline Growth

42. [redacted] and [redacted] submitted an affidavit that describes the processes used by Nouveau to grow and anneal its diamonds. *See* Nouveau Affidavit.

43. Nouveau grows diamond on seeds placed on a flat substrate, referred to as an "open" holder. Nouveau Affidavit at 5.A., View 1; *see also* Capano Rpt. at ¶¶ 126, 180.

44. Nouveau uses a programmable logic controller (PLC) to control its growth process, and it made the source code available for inspection. Ex. 13, Email from K. Patariu to M. Snow et al. dated July 23, 2020.

45. Plaintiffs' infringement expert relied upon the Nouveau Affidavit and PLC source code as reflective of Nouveau's diamond growing process. *See, e.g.,* Capano Rpt. at ¶¶ 169, 196, 225.

46. Nouveau grows its diamonds for about [redacted] hours. Nouveau Affidavit at 5.N.

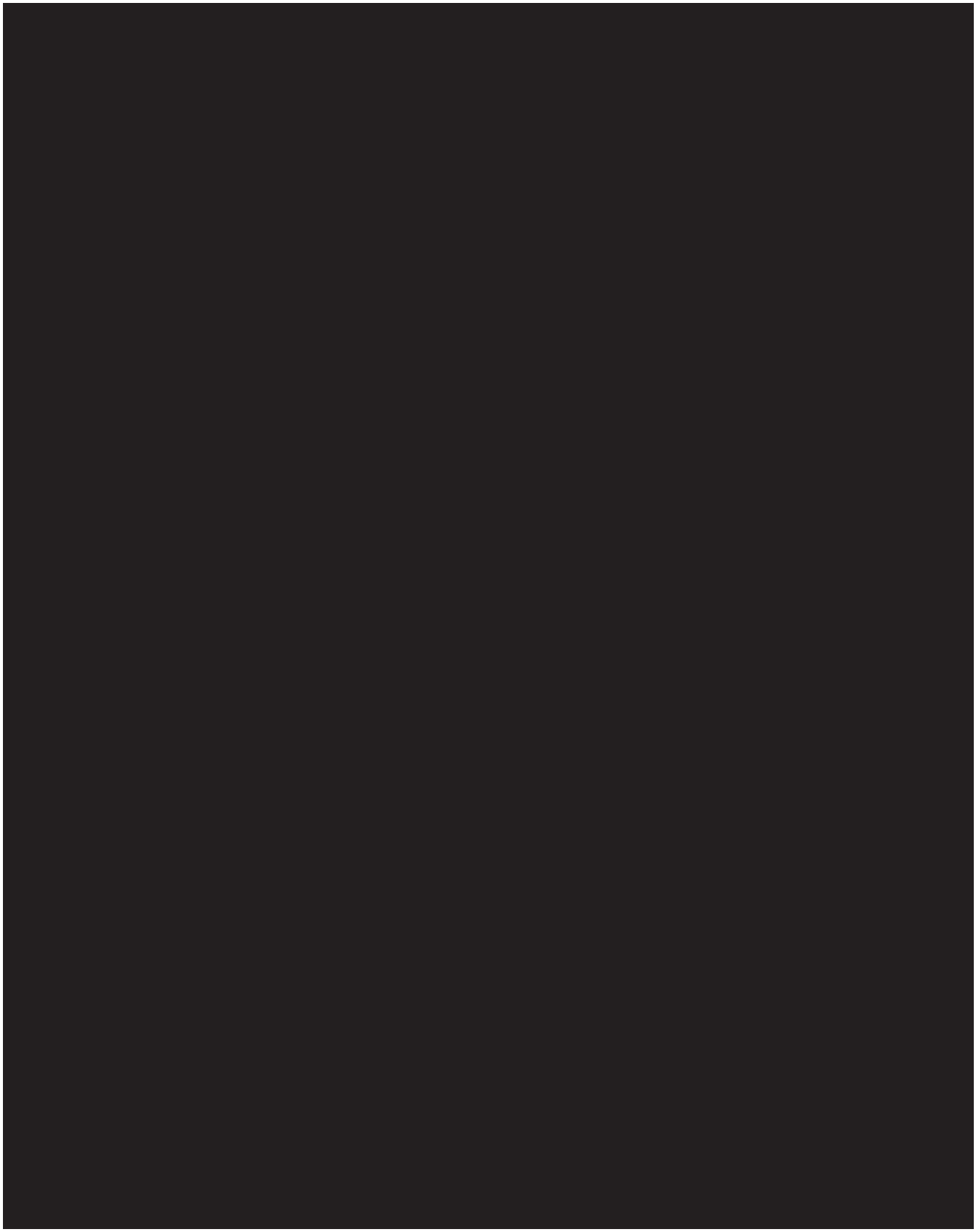
47. A typical [redacted] begins with at least [redacted] Nouveau Affidavit at VIEW 3; Pinneo Rpt. at ¶ 88; Capano Rpt. at ¶ 273.

[redacted]

48. A single-crystal domain and a polycrystalline domain grow on each seed. Nouveau Affidavit at 5.E; Capano Rpt. at ¶¶ 99, 102, 106, 191, 281.

49. The polycrystalline domains include polycrystalline diamond [redacted]. Capano Rpt. at ¶¶ 99, 101, 102, 168, 201, 215.

50. The polycrystalline domains [redacted] as shown below in Views 6 and 10 of the Nouveau Affidavit.



VIEW 6 / NV967

[redacted]

VIEW 10 / NV971

51. After growth is completed, the diamonds have "[redacted] polycrystalline growth [redacted] Nouveau Affidavit at 5.O.

52. [redacted] polycrystalline material (including as depicted in the image produced at NV971) is grown [redacted]. Nouveau Affidavit at 5.E ("There is [redacted] polycrystallinity on [redacted] diamond."); Nouveau Affidavit at 5.N., 5.O; Pinneo Rpt. at ¶¶ 477–78; Capano Rpt. at ¶¶ 215, 281.

[redacted]

B. In Nouveau's Process, the Surface Temperature Gradients Exceed 20° C

53. Non-monocrystalline growth at the periphery of a single-crystal domain "suggests that there is a relatively large temperature gradient across the surface." Gleason Rpt. at ¶ 113.

54. The '078 patent teaches that "temperature gradients of less than 20° C are necessary to produce uniform growth over large diamonds." Capano Rpt. at ¶ 186.

55. The '078 patent teaches "strictly controlling the temperature gradients across the growth surface" to "avoid defects like polycrystallinity and twinning." Capano Rpt. at ¶ 69.

56. The '078 patent states that "[t]he . . . holder . . . makes a thermal contact with a side surface of the diamond 136 adjacent to an edge of a top surface of the diamond 136. . . . [and] . . . acts as a heat-sink to prevent the formation of twins or polycrystalline diamond along the edges of the growth surface of the diamond 136." '078 patent at 4:48–55.

57. The '078 patent states that "[h]owever, the distance [between the top of the side-contact-holder and the growth surface] can not be so large as to prevent the heat-sinking effect of the sheath . . . that prevents the formation of twins or polycrystalline diamond along the edges of the growth surface of the diamond."). '078 patent at 5:5–8.

58. The '078 patent teaches that "[b]y repositioning the diamond within the holder, the heat-sinking of the edges of the growth surface is improved." *See, e.g.*, '078 patent at 12:36–38; *id.* at 11:15–27, 12:30–38.

59. The '078 patent states that "[p]recise control over . . . growth surface temperature gradients prevents the formation of polycrystalline diamond or twins such that a large single crystal diamond can be grown." *See, e.g.*, '078 patent at 4:52–55, 5:5–8, and 6:51–54.

60. Nouveau's diamond batches [redacted] Capano Rpt. at ¶¶ 214–15.

[redacted]

61. Dr. Vohra testified that a holder contacting the sides of the diamonds would be necessary to maintain thermal gradients under 30° C. Ex. 14, Vohra Dep. Tr. at 179:24–180:9.

62. Dr. Vohra testified that graphite growth at the edges of a diamond surface indicates that those edges are "much hotter" than the center. Vohra Dep. Tr. at 168:3–16.

63. In its ordinary process, Nouveau does not measure the temperature gradients on the growth surfaces of its diamonds. Nouveau Affidavit at 5.N; Capano Rpt. at ¶ 369.

64. Nouveau only started measuring temperature gradients across its diamonds in response to this litigation. Nouveau Affidavit at 5.K.

65. Nouveau produced data files corresponding to thermal camera measurements taken at various points during Nouveau's growth process using an emissivity setting of 0.1 and transmissivity setting of 0.85. Pinneo Rpt. at ¶¶ 178–79. These files are produced in "CSV" or comma-separated value format and include raw numbers that can be used for processing or plotting. Pinneo Rpt. at ¶¶ 181, 250–55; *see* NV2518, NV2521, NV2524, NV2527, NV2531, NV2534, NV2536, NV2539, NV2542, NV2545, NV2548, NV2551, NV2554, NV2557, NV2560, NV2563, NV2566, NV2569, NV2867, NV2870, NV2873, NV2876, NV2879, NV2882, NV2885, NV2994, NV2997, NV3000, NV3003, NV3006, NV3009, NV3012, NV3015, NV3018, NV3021, NV3024, NV3027, NV3030, NV3033, NV3036, NV3039, NV3124, NV3127, NV3130, NV3133, NV3136, NV3139, NV3142, NV3145, NV3148, NV3151, NV3296, NV3299, NV3302, NV3305, NV3308, NV3311, NV3314, NV3317, NV3320, NV3323, NV3324, NV3326, NV3329, NV3332, NV3335, NV3338, NV3341, NV3344, NV3347, NV3479, NV3482, NV3485, NV3488, NV3491, NV3494, NV3497, NV3500, NV3503, NV3506, NV3509, and NV3512.

66. Each raw data file is accompanied by (i) a traditional video documenting the thermal camera, the diamonds growing inside the reactor, and the exterior of the reactor, and (ii) a second

[redacted]

video recording the technician's computer display. Pinneo Rpt. at ¶¶ 180, 224–49; Capano Rpt. at ¶ 225.

67. At the direction of Dr. Pinneo, Dr. Martens analyzed each raw data file listed above by determining a maximum temperature gradient within a circular region of analysis (ROA) centered on the middle diamond in a batch. Martens Rpt. at 14–22; Pinneo Rpt. at ¶ 264.

68. The circular ROA has a diameter that is roughly 80% of the seed diameter. Pinneo Rpt. at ¶ 264–265. The size of the ROA was selected to exclude polycrystalline growth from the majority of Dr. Martens' analyses. Pinneo Rpt. at ¶¶ 264–66.

69. Dr. Martens found that the average value of all maximum temperature gradients determined from the files listed in Paragraph 46 is [redacted]° C, and the minimum value is [redacted]° C. Martens Rpt. at vi, 21; *see also* Pinneo Rpt. at ¶¶ 248, 268.

70. The final diamond [redacted] depicted during growth in videos NV1189, NV955, and NV1185 is NV1340–49. Pinneo Rpt. at ¶¶ 88–90.

71. M7D's corporate representative testified that [redacted]

C. Nouveau Anneals Its Diamonds at or Below 3[redacted] GPa

72. Nouveau anneals its diamonds [redacted]. Nouveau Affidavit at 6.A.

73. In the [redacted] annealing [redacted], the diamond [redacted] is annealed at less than [redacted]. Nouveau Affidavit at 6.A.

74. In the [redacted] annealing [redacted], the diamond [redacted] is annealed at less than 3[redacted] GPa. Nouveau Affidavit at 6.B.

[redacted]

Dated: October 13, 2020

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